

E1
directly thereafter compressing said conditioned feed material in an environment of saturated steam at an elevated pressure in the range of about 15-25 psig to destructure said fibers [at a temperature above 100 deg. C] without significant breakage across grain boundaries;

preheating the destructured material in an environment of saturated steam at a pressure higher than the pressure of the environment at which the material was destructured; and

conveying the pre-heated material to the inlet of a primary disc refiner operating at a higher pressure than the pressure of the environment at which the material was destructured.

E2
36. (Thrice Amended) A method for producing thermo-mechanical pulp in primary disc refiner from lignocellulose fiber-containing feed material comprising the steps of:

first conditioning said fiber containing feed material in an environment of saturated steam at an elevated pressure in the range of about 10-25 psig to produce a conditioned feed material [at a temperature above 100 deg. C] without significant breakage across grain boundaries;

preheating the destructured material in an environment of saturated steam at a pressure above the glass transition temperature of the lignin in the material, for a period of time less than 30 seconds;

conveying the pre-heated material to the inlet of a primary disc refiner operating at a temperature above the glass transition temperature of the lignin; and

refining the material at a disc speed of rotation that is greater than 1500 rpm for a double disc refiner or greater than 18000 rpm for a single disc refiner.

E3
37. The method of claim 36, wherein the preheat time period is in the range of about 5-10 seconds.